UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

APPLICATION OF TEXAS UTILITIES GENERATING COMPANY, ET AL. FOR AN OPERATING LICENSE FOR COMANCHE PEAK STEAM ELECTRIC STATION UNITS #1 AND #2 (CPSES)

Docket Nos. 50-445 and 50-446

AFFIDAVIT OF HENRY AND DARLENE STINER

Q: Mr. and Mrs. Stiner, have you read a copy of Applicants' Summary of the Record Regarding Weave and Downhill Welding, filed July 15, 1983?

A: (Both) Yes.

Q: Is there anything you would like to clarify for the record in regard to Applicants' pleading?

A: (Both) Yes.

A: (Mrs. Stiner) I was certified to weld to both ASME and AWS D1.1, both of which are used at Comanche Peak. ASME is used for Class 1, 2 and 3 hangers and supports; it's not used for Class 5. AWS D1.1 is used for Class 4, 5, and 6 -- anything that's not safety-related.

Q: Isn't Class 5 safety-related?

A: (Mrs. Stiner) Procedurally, no. Logically, tbey should be considered safety-related, because they are all in safety-related areas.

Q: Mr. Stiner, what codes did you work to at Comanche Peak?

A: (Mr. Stiner) I was also certified to weld to both ASME and AWS D1.1 Codes. As Darlene stated, both of these Codes are used at Comanche Peak.

Q: And is it also your understanding that ASME is used for Class 1, 2, and 3 hangers and supports, but not for Class 5, and that AWS D1.1 is used for Class 4, 5, and 6?

A: (Mr. Stiner) Yes. I'd like to point out that AWS states, regarding downhill welding (see copy of sections attached):

AWS D1.1, 4.6.8:

"The progression for all passes in vertical position welding shall be upward, except that undercut may be repaired vertically downwards when preheat is in accordance with Table 4.2, but not lower than 70°F (21°C). However, when tubular products are welded, the progression of vertical welding may be upwards or downwards but only in the direction or directions for which the welder is qualified."

AWS D1.1, 5.16.5:

"For the qualification of a welder the following rules shall apply:

". . . 5.16.5. A change in the position of welding to one for which the welder is not already qualified shall require requalification."

AWS D1.1, 5.16.7:

"When the plate is in the vertical position, or the pipe or tubing is in the 5G or 6G position, a change in the direction of welding shall require requalification."

Q: So downhill welding is not supposed to be used normally, but only in certain specific instances?

A: (Mr. Stiner) That's right. And then the welder is supposed to be qualified or requalified to do it.

Q: Is there anything further you'd like to say about downhill welding?

A: (Mrs. Stiner) Whenever you do a downhill weld, you don't get proper penetration -- it's sort of like skimming across the top. I have made downhill welds myself at Comanche Peak, under orders. Like if I came up on a

weld that was in a particularly hard position to get to, sometimes my foreman would tell me to just go ahead and run a downhill weld over my stringer bead weld.

Q: Were you qualified for downhill welding?

A: (Mrs. Stiner) No, I wasn't.

A: (Mr. Stiner) No, I wasn't. I talked about downhill welding some in my testimony (CASE Exhibit 666, 9/1/82, pages 45-46). I don't think I made it clear in my testimony, but I also have done downhill welding.

Q: But you hadn't been qualified to do it?

A: (Mr. Stiner) No, but I was told to do it anyhow.

Q: What specific codes and procedures did you use at Comanche Peak?

A: (Mrs. Stiner) WPS 11032, 10046, and 11065, and CPM 6.9, plus quality control procedures (it's been a while, but I believe the numbers of the ones I used primarily as far as QC control procedures were QI-QAP-11.16-1 and ANSI Code B31.1).

A: (Mr. Stiner) As stated in my testimony (page 8), the welding procedures for the C-10 and A-10 welding process codes are 11032, 11065, and 10046; the procedure that states that weave welding is not to be used is CPM-6.9, to the best of my recollection. This is also indicated on the Weld Parameter Guides issued from the rod shack to each welder when material is picked up. If you go over the maximum bead width, you'd be weave welding.

A: (Mrs. Stiner) 11032 is the one I used the most. It's interchangeable with and often used in place of 11065. 11032 states that stringer beads only shall be used. Therefore, it isn't permitted even on the cap or the root as Applicants have stated can be done.

Q: Is there anything else you'd like to clarify regarding weave welding?

A: (Mr. Stiner) Regarding weave welding and the heat input, where Mr. Brandt says in his Affidavit (page 2):

> "The purpose of limiting bead width for welds on materials requiring impact testing is to control effective heat input because excessive heat input could cause broadening and subsequent embrittlement of the heat affected zone."

. . . when we're talking about maximum bead width, we're talking about the effective heat input also. During the whole term of my employment at Brown & Root, the only time that I was given a temperature indicating crayon was in the Welding Qualification Test Center (WQTC).

Q: Is it a requirement at Comanche Peak that a temperature indicating crayon be used?

A: (Mr. Stiner) I do know it's required by some procedures. But it's not a practice that is used by the structural welders at Comanche Peak.

In regard to Applicants' Exhibits 141N-141V, which Mr. Brandt stated permit the use of weave welding at Comanche Peak, on those procedures under preheat on the Welding Procedure Specification (4th box, left-hand column), the preheat temperature and interpass-temperature range is indicated. At Comanche Peak, they don't check the preheat temperature or the interpass temperature. When I tested at the WQTC, they gave me a temperature indicating crayon to check and be sure that each consecutive pass was not heating the parent metal up above the interpass temperature range which was in the procedure. Even on your test coupons if you rise above that interpass temperature, when they do the bend test on the strips that they'll cut out of your test coupon, you will fail the test because you will have created embrittlement

of the parent metal which will show cracks in the weld of the test coupon.

But out in the field, I have very seldom seen anyone use the temperature indicating crayons or any other kind of temperature measuring device. I never used the crayons myself. Generally, because of my experience with welding, I could tell when it was getting too hot if I held my hand near the metal. But we were under such pressure to put up the hangers that most of the time we didn't take time to check the temperature. Under one foreman, we had a quota that we had to meet every day. I talked about some of the pressures we were under in my testimony (see especially pages 18 and 19).

A: (Mrs. Stiner) The welders didn't have an hour or two to wait for it to cool off; they had to get the weld made because they had so many to get done each day. Plus the fact that they always had to worry about somebody else coming along and stealing their welding machine or their lead while they went to the restroom or something. At the end of the day, your foreman didn't understand why you didn't have more hangers done. Most of the time, the foreman sent the welder to look for their machine and their lead when it was stolen; they didn't have you check out another machine. You might spend hours looking for a machine that nobody is going to admit was yours.

A: (Mr. Stiner) They created such adverse conditions for the welder that he just had a limited amount of time to complete the required amount of hangers. Welders shouldn't have to work under such adverse conditions.

A: (Mrs. Stiner) I'd like to say something else about the weave welding. As an example, if you took a rod and struck an arc and held it to the metal and just kept it burning in the same spot, your metal would just fall right out after a time. Also, the longer you hold it there, the hotter it gets.

So when you weave weld, the longer it takes you to progress up the piece of metal, the hotter the piece is going to be in one specific area. Therefore, the parent metal would become brittle because you are not controlling your heat input.

Q: Mrs. Stiner, did you ever use a temperature indicating crayon?

A: (Mrs. Stiner) Only in WQTC. I've never used it other than in WQTC. During my inspections, only a few times have I seen anyone using a temperature stick and that was generally pipe welders, heliarcers, and so forth. Most of the time it was not on pipe supports; I don't recall ever seeing it used on pipe supports.

Q: How can they check the effective heat zone and be sure they don't get it too hot?

A: (Mr. Stiner) They can't. There are other heat checking devices they could use, but they don't use them at Comanche Peak.

A: (Mrs. Stiner) There's no way they can be sure they're not getting it too hot, because they don't use any heat checking devices at all most of the time.

Q: How does grinding down help correct weave welding?

A: (Mrs. Stiner) It does not help it at all. The weld underneath is still a weave weld, which is weaker because there has been no control over the heat input.

Q: How could you correct weave welding then?

A: (Mrs. Stiner) You grind it completely down to base metal and reweld it with a stringer bead. It would really be better to cut the whole thing down and redo it, because you've still got damaged parent metal.

Q: Was that what you did, Mr. Stiner?

A: (Mr. Stiner) No. As I testified (CASE Exhibit 666, pages 9-13, 33-34, and 53), I had to go along and repair bad weave welds that other welders had made most of the time, and I was told not to grind all of the base metal out but just to grind off the surface and cap it so it would appear to be a sound weld. In other words, it was just covered up, not corrected.

Q: Is there anything else about weave welding?

A: (Mrs. Stiner) Yes, there's one more thing which needs to be clarified on page 25 of my testimony, lines 2 through 8 (CASE Exhibit 667, 9/1/82). On page 10 of Applicants' 7/15/83 pleading, it is stated "It is clear that the 'repair' alleged by the Stiners to have been performed was not required because of some structural weakness in the weld or welded material. Rather, the repair was cosmetic, there being no structural reason for limiting weave welding on materials not requiring Charpy impact testing." I thought it was clear in my testimony on page 25 that the weave welds were discovered when I was inspecting the hanger for torquing; the welds were in the process of being made -- it was <u>not</u> an initial root pass or merely a cover pass for cosmetic reasons, as indicated by Applicants. Later, when I returned for final inspection of the torquing, I again noted the weave welds, which were still in process of being made; they were <u>not</u> merely cosmetic problems, and I wrote an NCR on them accordingly. As stated in my testimony, the superintendant whom I took to see the welds himself told me to have them cut the hanger down. You don't cut a hanger down for "cosmetic reasons."

I have read the foregoing 7-page affidavit and it is true and correct to the best of my knowledge and belief. I am making this statement freely, without any threats, inducements, or promises of rewards. This affidavit was prepared under my personal direction, and the thoughts and words expressed herein are my own thoughts and words (with the exception of minor grammatical changes, either to correct spelling or to clarify what I meant, which did not change the intent of my thoughts).

Henry a Stiner

Henry Stiner

Darlene A Stiner

Darlene Stiner

Date: July 25, 1983

STATE OF TEXAS

On this, the 25th day of July, 1983, personally appeared before me Henry Stiner and Darlene Stiner, known to me to be the persons whose names are subscribed to the foregoing instrument, and acknowledged to me that they executed the same for the purposes therein expresses.

Subscribed and sworn before me on the 25th day of July, 1983.

Loretta Rayner

Notary Public in and for the State of Texas

My Commission Expires: 2/28/85

ANSI/AWS D1.1-81

An American National Standard
Approved by
American National Standards Institute

Structural Welding Code–Steel

Fifth Edition

Superseding
AWS D1.1-80

Prepared by
AWS Structural Welding Committee

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Effective January 1, 1981

AMERICAN WELDING SOCIETY, INC.
2501 N.W. 7th Street, Miami, FL 33125

Table 4.5.2
Permissible atmospheric exposure of low hydrogen electrodes

Electrode	Column A (hours)	Column B (hours)
A5.1		
E70XX	4 max	Over 4 to 10 max
A5.5		
E70XX	4 max	Over 4 to 10 max
E80XX	2 max	Over 2 to 10 max
E90XX	1 max	Over 1 to 5 max
E100XX	1/2 max	Over 1/2 to 4 max
E110XX	1/2 max	Over 1/2 to 4 max

Notes:
1. Column A. Electrodes exposed to atmosphere for longer periods than shown shall be redried before use.
2. Column B. Electrodes exposed to atmosphere for longer periods than those established by testing shall be redried before use.

4.5.4 Redrying Electrodes. Electrodes that conform to the provisions of 4.5.2 shall subsequently be redried no more than one time. Electrodes that have been wet shall not be used.

4.5.5 Manufacturer's Certification. When requested by the Engineer, the contractor or fabricator shall furnish an electrode manufacturer's certification that the electrode will meet the requirements of the classification.

4.6 Procedures for Shielded Metal Arc Welding

4.6.1 The work shall be positioned for flat position welding whenever practicable.

4.6.2 The classification and size of electrode, arc length, voltage, and amperage shall be suited to the thickness of the material, type of groove, welding positions, and other circumstances attending the work. Welding current shall be within the range recommended by the electrode manufacturer.

4.6.3 The maximum diameter of electrodes shall be as follows:

4.6.3.1 5/16 in. (8.0 mm) for all welds made in the flat position, except root passes.

4.6.3.2 1/4 in. (6.4 mm) for horizontal fillet welds.

4.6.3.3 1/4 in. (6.4 mm) for root passes of fillet welds made in the flat position and groove welds made in the flat position with backing and with a root opening of 1/4 in. or more.

4.6.3.4 5/32 in. (4.0 mm) for welds made with EXX14 and low hydrogen electrodes in the vertical and overhead positions.

4.6.3.5 3/16 in. (4.8 mm) for root passes of groove welds and for all other welds not included under 4.6.3.1, 4.6.3.2, 4.6.3.3, and 4.6.3.4.

4.6.4 The minimum size of a root pass shall be sufficient to prevent cracking.

4.6.5 The maximum thickness of root passes in groove welds shall be 1/4 in. (6 mm).

4.6.6 The maximum size of single-pass fillet welds and root passes of multiple-pass fillet welds shall be

4.6.6.1 3/8 in. (9.5 mm) in the flat position.

4.6.6.2 5/16 in. (8.0 mm) in the horizontal or overhead positions.

4.6.6.3 1/2 in. (12.7 mm) in the vertical position.

4.6.7 The maximum thickness of layers subsequent to root passes of groove and fillet welds shall be

4.6.7.1 1/8 in. (3 mm) for subsequent layers of welds made in the flat position.

4.6.7.2 3/16 in. (4 mm) for subsequent layers of welds made in the vertical, overhead, or horizontal positions.

4.6.8 The progression for all passes in vertical position welding shall be upward, except that undercut may be repaired vertically downwards when preheat is in accordance with Table 4.2, but not lower than 70° F (21° C). However, when tubular products are welded, the progression of vertical welding may be upwards or downwards but only in the direction or directions for which the welder is qualified.

4.6.9 Complete joint penetration groove welds made without the use of steel backing shall have the root gouged to sound metal before welding is started from the second side, except as permitted by 10.13.

Part C
Submerged Arc Welding

4.7 General Requirements

4.7.1 Submerged arc welding may be performed with one or more single electrodes, one or more parallel electrodes,[11] or combinations of single and parallel electrodes. The spacing between arcs shall be such that the slag cover over the weld metal produced by a leading arc does not cool sufficiently to prevent the proper weld deposit of a following electrode. Submerged arc welding with multiple electrodes may be used for any groove or fillet weld pass.

11. See Appendix I.

(1) Partial joint penetration groove welds shall have the designated effective throat.

(2) Fillet welds shall have fusion to the root of the joint, but not necessarily beyond.

(3) Minimum leg size shall meet the specified fillet weld size.

(4) The partial joint penetration groove welds and fillet welds shall:

(a) Have no cracks.

(b) Have thorough fusion between adjacent layers of weld metals and between weld metal and base metal.

(c) Have weld profiles conforming to intended detail, but with none of the variations prohibited in 3.6.

(d) Have no undercut exceeding the values permitted in 9.25.1.5.

5.12.4 All-Weld-Metal Tension Test (electroslag and electrogas). The mechanical properties shall be no less than those specified in 4.16.

5.12.5 Nondestructive Testing. For acceptable qualification, the weld, as revealed by radiographic or ultrasonic testing, shall conform to the requirements of 8.15, 9.25, or 10.17, whichever is applicable.

5.12.6 Visual Inspection—Pipe and Tubing. For acceptable qualification, a pipe weld, when inspected visually, shall conform to the following requirements:

(1) The weld shall be free of cracks.

(2) All craters shall be filled to the full cross section of the weld.

(3) The face of the weld shall be at least flush with the outside surface of the pipe, and the weld shall merge smoothly with the base metal. Undercut shall not exceed 1/64 in. (0.4 mm). Weld reinforcement shall not exceed the following:

Pipe wall thickness, in. (mm)	Reinforcement, max. in	mm
3/8 (9.5) or less	3/32	2.4
Over 3/8 to 3/4 (19.0) incl.	1/8	3.2
Over 3/4	5/16	4.8

(4) The root of the weld shall be inspected, and there shall be no evidence of cracks, incomplete fusion, or inadequate joint penetration. A concave root surface is permitted within the limits shown below, provided the total weld thickness is equal to or greater than that of the base metal.

(5) The maximum root surface concavity shall be 1/16 in. (1.6 mm) and the maximum melt-thru shall be 1/8 in. (3.2 mm).

5.12.7 Visual Inspection—Plate. For acceptable qualification, the welded test plate, when inspected visually, shall conform to the requirements for visual inspection in 9.25.1.

5.13 Records

Records of the test results shall be kept by the manufacturer or contractor and shall be available to those authorized to examine them.

5.14 Retests

If any one specimen of all those tested fails to meet the test requirements, two retests for that particular type of test specimen may be performed with specimens cut from the same procedure qualification material. The results of both test specimens must meet the test requirements. For material over 1-1/2 in. (38.1 mm) thick, failure of a specimen shall require testing of all specimens of the same type from two additional locations in the test material.

Part C
Welder Qualification

5.15 General

The qualification tests described in Part C are specially devised tests to determine the welder's ability to produce sound welds. The qualification tests are not intended to be used as a guide for welding during actual construction. The latter shall be performed in accordance with the requirements of the procedure specification.

5.16 Limitation of Variables

For the qualification of a welder the following rules shall apply:

5.16.1 Qualification established with any one of the steels permitted by this Code shall be considered as qualification to weld or tack weld any of the other steels.

5.16.2 A welder shall be qualified for each process used.

5.16.3 A welder qualified for shielded metal arc welding with an electrode identified in the following table shall be considered qualified to weld or tack weld with any other electrode in the same group designation and with any electrode listed in a numerically lower group designation.

Group designation	AWS electrode classification*
F4	EXX15, EXX16, EXX18
F3	EXX10, EXX11
F2	EXX12, EXX13, EXX14
F1	EXX20, EXX24, EXX27, EXX28

*The letters "XX" used in the classification designation in this table stand for the various strength levels (60, 70, 80, 90, 100, and 120) of deposited weld metal.

5.25.4 A welder qualified with an approved electrode and shielding medium combination shall be considered qualified to weld or tack weld with any other approved electrode and shielding medium combination for the process used in the qualification test.

5.25.5 A change in the position of welding to one for which the welder is not already qualified shall require requalification.

5.25.6 A change from one diameter wall pipe grouping shown in Table 5.26.1 to another shall require requalification.

5.25.7 When the plate is in the vertical position, or the pipe or tubing is in the 5G or 6G position, a change in the direction of welding shall require requalification.

5.25.8 The omission of backing material in complete joint penetration welds welded from one side shall require requalification.

5.17 Qualification Tests Required

5.17.1 The welder qualification tests for manual and semiautomatic welding shall be as follows.

5.17.1.1 Groove weld qualification test for plate of unlimited thickness.

5.17.1.2 Groove weld qualification test for plate of limited thickness.

5.17.1.3 Fillet weld qualification tests for fillet welds only.

(1) For welds in joints having a dihedral angle (ϕ) of 75 deg or less, qualification tests shall be as required by 5.18 or 5.19. Such qualification will be valid for fillet welds having angles greater than 75 deg.

(2) For welds in joints having a dihedral angle (ψ) greater than 75 deg and not exceeding 135 deg, tests shall be as required by 5.22, Option 1 or Option 2—contractor's option.

5.17.2 The pipe or tubing qualification tests for manual and semiautomatic welding shall be as follows.

5.17.2.1 Groove weld qualification test for butt joints on pipe or square or rectangular tubing.

5.17.2.2 Groove weld qualification test for T-, K-, or Y-connections on pipe or square or rectangular tubing.

5.17.2.3 Groove weld qualification test for butt joints on square or rectangular tubing tested on flat plate.

5.17.3 The welder who makes a complete joint penetration plate groove weld procedure qualification test that meets the requirements is thereby qualified for that process and test position for plates and square or rectangular tubing equal to or less than the thickness of the test plate welded. If the test plate is 1 in. (25.4 mm) or greater in thickness, the welder will be qualified for all thicknesses. The welder is also qualified for fillet welding of plate and pipe, as shown in Table 5.23.

5.17.4 The welder who makes a complete joint penetration groove weld pipe procedure qualification test, without backing strip, that meets the requirements is thereby qualified for that process. His qualification will include the test position for pipe having a wall thickness equal to or less than the wall thickness of the test pipe welded. If the test pipe welded is 6 in. (152 mm) Sch. 80 or 8 in. (203 mm) Sch. 120 pipe, he will be qualified for all thicknesses. This welder is also qualified for fillet welding of plate and pipe as shown in Table 5.23. If the diameter of the job-size pipe or tubing used in qualification is 4 in. (102 mm) or less, the qualification is limited to diameters 3/4 in. (19 mm) through 4 in. (102 mm), inclusive. If the diameter of job-size pipe is over 4 in. (102 mm), the qualification is limited to a minimum diameter of greater than 1/2 test diameter or 4 in. (102 mm), whichever is larger. The wall thickness qualified and the number of test specimens required shall be as specified in Table 5.26.1.

5.18 Groove Weld Plate Qualification Test for Plate of Unlimited Thickness

The joint detail shall be as follows: 1 in. (25.4 mm) plate, single-V-groove, 45 deg included angle, 1/4 in. (6.4 mm) root opening with backing (see Fig. 5.18A). For horizontal position qualification, the joint detail may, at the contractor's option, be as follows: single-bevel-groove, 45 deg groove angle, 1/4 in. root opening with backing (see Fig. 5.18B). Backing must be at least 3/8 in. (9.5 mm) by 3 in. (76.2 mm) if radiographic testing is used without removal of backing. It must be at least 3/8 in. by 1 in. (25.4 mm) for mechanical testing or for radiographic testing after the backing is removed. Minimum length of welding groove shall be 5 in. (127 mm).

5.19 Groove Weld Plate Qualification Test for Plate of Limited Thickness

The joint detail shall be as follows: 3/8 in. (9.5 mm)